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Stock Returns, Inflation and the "Reverse Causality" Hypothesis: Evidence from Nigeria

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Abstract

This paper attempts to empirically examine the Reverse Causality hypothesis within the Nigerian context during the period 1980 – 2011. Employing Vector Error Correction Methodology (VECM), causality was found between inflation and government stocks, with causality running from government stocks to inflation, thus providing evidence in support of the reverse causality hypothesis. The results from the forecast error variance decomposition (FEVD) and impulse response functions tend to further lend credence to this finding. Accordingly, this study suggests, in part, the need for a tight monetary policy which would help to reduce inflation and stock prices, as such measures would leave the individuals with less money to buy stocks. Such efforts should be complemented by augmenting domestic production and encouraging investment through inexpensive bank finance.

Keywords: *Reverse causality, Stock Returns, VAR Methodology, Nigeria.*

JEL Code: E3; F21; G11

1. Introduction

Prior to the work of Geske and Roll (1983), the conventional view of most theoretical and empirical research on the relation between returns on financial assets and inflation has been that changes in inflationary expectations was for the causative influence. In other words, stock returns were conceived to be negatively related to changes in expected inflation, at least, in the short-run (see, for instance, Jeffe and Mandelker, 1976; Nelson, 1976; and Bodie, 1976), a development which, in principle, tends to contradict the Fisherian hypothesis. Fisher (1930) hypothesized that real stock price is independent of inflation. This implies that in the regression of expected returns on expected inflation, it should possess a unity coefficient. However, most of those early empirical studies on Fisher's hypothesis were largely preoccupied with describing the nature of the relationship between inflation and stock returns and not with any explanation of the results. Since the 1980s, however, the need for a better explanation has spurred a number of alternative hypotheses, such as the tax effect hypothesis (Feldstein, 1980); proxy hypothesis (Fama, 1981); and the reverse causality hypothesis (Geske and Roll, 1983).

Empirical studies on these three hypothetical explanations using data from both the developed and emerging economies have however produced mixed results, an indication that the actual relationship between these two variables of interest is far from being certain. Specifically, most studies on the reverse causality hypothesis have produced mixed results. For instance, while study by Ely and Robinson (1992) find evidence in support of the reverse causality hypothesis, others such as Najand and Seifert (1990) refute it. Yet others, such as Oxman (2012) produced inconclusive evidence. Interestingly, most of these studies were conducted in developed economies. However, considering the peculiarities of developing economies, like Nigeria, will the reverse causality hypothesis be validated or refuted? This paper therefore tries to complement the existing literature in, at least, three important dimensions. First, while empirical studies on the United States of America (U.S.) capital market and those of emerging capital markets abound, studies on developing economies with relatively nascent stock markets and unique transmission mechanism, particularly on Nigeria, have been sparse. Second, many of those studies on developing countries have been largely cross-sectional in nature, a development that tends to ignore the different inflationary processes prevailing in different economies. Lastly, this study employs a vector autoregression (VAR) and error correction mechanism in order to explore the causality relation and the dynamic impact of shocks that may arise.

The rest of the paper is structured as follows: section two presents a review of the relevant literature on stock-returns and inflation nexus, while section three provides the methodology, including the theoretical underpinnings and data description. Section four presents and discusses the empirical results, while the final section concludes the paper.

2. Literature Review

Following Fisher (1930), inflation should not affect real stock returns, a notion that has come to be described as the Fisherian hypothesis in the literature. According to him, ex-ante nominal interest rate should fully anticipate movements in expected inflation in order to produce the equilibrium real interest rate. The expected real interest rate, in turn, is determined by real factors such as the productivity of capital and time preference of consumers, and is independent of expected inflation rate. Following this hypothesis, real assets should provide a hedge against inflation.

In a bid to validate Fisher's hypothesis, a number of studies have been conducted, first, in the case of the U.S. (Fama, 1982; Geske and Roll, 1983) and later in other European countries, (Asprem, 1989). Although these studies employed diverse empirical approaches, their findings point to a significant negative relationship between inflation and stock returns. They however failed to provide any tenable explanation for this contrast, a development that has been termed, **"a stock return-inflation puzzle"**. As remarked by Smart (2005); Bruno and Paulo (2009), these early studies were preoccupied with describing the nature of the relationship between stock returns and inflation, and not with providing a plausible explanation for the puzzle.

Since the early 1980s, however, three major alternative explanations have been proposed to explain this phenomenon alongside others. These approaches are: the **tax effect hypothesis** by Feldstein (1980), the proxy hypothesis by Fama (1981) and the reverse causality hypothesis by Geske and Roll (1983). Feldstein (1980) tax effect hypothesis posits that inflation generates artificial capital gains owing to the valuation of depreciation and inventories subject to taxation. This increases corporate tax liabilities which, in turn, reduces real after-tax earnings. In such inflationary situation, rational investors would react by reducing common stock valuation. In this regard, inflation "causes" movements in stock prices. Although the reasoning is seemingly plausible, however, the explanation is contextual and is woven around the US tax regime. Evidence, however, abound of negative stock returns-inflation relations in countries with different tax regimes.

The "proxy effect" hypothesis proposed by Fama (1981) argues that the negative relationship between stock returns and inflation has its foundation in the money-demand theory and the quantity theory of money. Fama argues that rising inflation tends to reduce real economic activity and the demand for money. The fall in economic activities in turn negatively affects the future corporate profit and, by extension, stock prices. He, however, remarked that the statistical relationship between stock returns and inflation would disappear once the effect of real output growth is controlled for. Since this pioneering work of Fama (1981), several empirical studies have been conducted to test the validity of this hypothesis. In this regard, Barnes et al (1999) and Merikas and Merika (2006) found evidence supporting this hypothesis in their studies. Other studies such as Cochran and Defing (1993) and Caporale and Jung (1997) found contradictory evidence in their studies.

Geske and Roll (1983) proposed the reverse causality hypothesis as a possible explanation of the negative association between inflation and stock prices, by introducing both fiscal and monetary linkages in a bid to explain the relationship between stock returns and inflation. They argued that stock prices' reaction in anticipation of future economic activity is highly correlated to government revenue, such that a fall in real economic output, not only affects stock prices negatively, but it also leads to a fall in government revenue and subsequent rise in fiscal deficits. According to them, in its bid to balance the budget, the Central Bank monetizes a portion of the fiscal deficits, thereby increasing the money supply and by extension, the inflation level.

Existing empirical studies on the reverse causality hypothesis have produced mixed results. Studies such as Solnik (1983), James, Kariesha and Partch (1985), Park and Ratti (2000); and Ely and Robinson (1992) tend to lend support for the reverse causality hypothesis; while other studies, such as Lee (1992) and McCarthy, Najand and Seifert (1990) reject it. However, some recent studies such as Kim and Ryoo (2011), Oxman (2012) and Rushdi, Kim and Silvapulle (2012) find mixed evidence on the ability of stock returns to sufficiently hedge against inflation.

3. Research and Methodology

3.1. Theoretical Underpinnings

Prior to 1966, inflation was considered fairly well for corporations. This perception was premised on the net debtor hypothesis which contended that net debtor would gain during inflation. This hypothesis indicated that corporations would experience increased earnings during periods of inflation and stock holders would profit from the resulting increase in the value of the firm (Reilly and Dyl, 1975). However, the problem in addressing inflation risk is that there are various types of inflation risks. According to Strongin and Persch (1997), inflation risk to which the fund is exposed depends partly on its holdings and partly on its time horizon – the shorter the horizon, the lower the risk, and vice versa. Also, the way that assets prices react to inflation largely depend on the prevailing monetary policy regime. Thus, in a country largely dominated by equity fund portfolio, one major way of protecting such equity fund against inflation is to embark on global diversification of such equity portfolio. On the other hand, if the portfolio is predominantly commodities, one way of minimizing the effects of inflation arising from the strength in the global economy is to sufficiently diversify such portfolio of commodities.

Hence, the need to effectively manage the deleterious effects of inflation risks has provided an excellent opportunity for the academia to develop and employ formal analytical techniques such as the Modern Portfolio Theory (MPT) or Capital Asset Pricing Theory (CAPT) (Cohen, Zinbarg and Zeikel, 1987). Essentially, MPT is a mathematical formulation aimed at selecting a collection of investment assets that has collectively lower risk than any individual asset. Similarly, CAPT aims at optimizing portfolio composition through effective diversification with a view to earning the investors required rate of return with minimum risk. Afterall, investors' would naturally prefer portfolio that they perceive to be return/risk efficient (Osaze, 2007).

3.2 Model Specification

Drawing upon the empirical literature reviewed and the theoretical underpinnings, we posit a simple model of vector autoregressive (VAR) framework to capture the dynamics of the relationship between inflation and stock investors' portfolio management whilst avoiding the pitfalls of endogeneity and integration of variables. It takes the following general form:

$$Z_t = \sum_{i=1}^{k} A_{\,t} Z_{t-1} + E_t \dots\dots\dots\dots\dots\dots (1)$$

Augmenting equation (1) with other relevant variables of interest, which were introduced to take account of the underdeveloped nature of portfolio management in Nigeria, we specify the generic form as:

Z_t = (GDS_t, INF_t, ASI_t, $MCAP_t$, $VTRANS_t$, $BDEF_t$)

Where:

Z_t = vector of variables in the determination of stock investors' portfolio management

A_i = Six by six matrices containing coefficients of all variables in portfolio management

Z_{t-1} = Vector of the lagged variables

Et = vector of the usual stochastic error term.

The six variables contained in the Z_t vector are the dependent and independent variables defined as follows:

GDS = Value of government stock traded

INF = Inflation rate

ASI = All-share index

MCAP = Market capitalization

VTRANS = Total volume of transactions

BDEF = Federal Government Budget deficits

3.3 Data

This study utilizes annual data for the period, 1980-2011 collected from the Nigerian Stock Exchange FactBook (various issues), the Nigerian Stock Exchange Annual Report (2011) and Central Bank of Nigeria (CBN) Statistical Bulletin (2011).

The descriptive statistics of the variables used for this study show that the mean values of government stock (GDS), Inflation rate (INF), All share index (ASI), Market Capitalization (MCAP), Total volume of transactions (VTRANS) and budget deficit (BDEF) are 2606.42, 21.72, 11742.88, 2264.88, 29124.76 and -184762.7 respectively. Evidently, the values indicate that the variables under focus tend to exhibit variation in terms of magnitude, suggesting that estimation at levels may introduce some bias in the results. Also, the Jarque-Bera statistics reject the null hypothesis of normal distribution for inflation rate, All-share index, market capitalization, volume of transactions and budget deficits. On the contrary, the null hypothesis of normal distribution is accepted for value of government stock.

Insert Table I Here

4. Analyses of results and discussion of findings.

4.1Testing for stationarity

It has been established in the literature that most time series variables are non-stationary and utilizing such non-stationary variables in empirical estimations might lead to spurious results and misleading policy prescriptions (Granger and Newbold, 1977). Hence, the time series data for all variables in the model are tested to determine their stationarity status, using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The essence of the ADF test is the null hypothesis of non-stationarity. To reject this, the ADF statistics must be more than the critical values and be significant. The Phillips-Perron test, on the other hand, is a robust test for serial correlation and time-dependent heteroscedasticities. The asterisk (*) denotes rejection of the unit root hypothesis at 1 percent level of significance. The ADF statistics were generated with a test for a random walk against stationary AR(1) with drift and trend with maximum lag of 1, while the PP test on the other hand, uses the automatic bandwith selection technique of Newey-West.

Insert Table II Here

4.2 Testing for Cointegration

After ascertaining that the series are stationary, the study employs cointegration test procedure developed by Johansen (1988) and Johansen and Juselius (1990). To establish whether a long-run relationship(s) exists among the variables of interest, as this is vital for the results to be emenable for policy making. Expectedly, this method should produce asymptotically optimal estimates since it incorporated a parametric correction for serial correlation. The number of lags used in the VAR is based on the evidence provided by the Akaike Information Criterion (AIC).

Following the approach by Johansen and Juselius (1990), two likelihood ratio test statistics, the Max-Eigen and Trace tests were utilized to determine the number of cointegrating vectors. The results reveal that both the Max-Eigen and Trace test statistics reject the null hypothesis of no cointegration at the 5 percent level. While the Max-Eigen test indicates that there are three cointegrating equations at the 5 percent level, Trace test indicates two cointegrating equations at the 5 percent level. The implication is that a linear combination of all the six series is stationary and, by extension, are said to be cointegrated. However, this evidence of a long-run relationship among the variables does not, in itself, identify the dynamics by which the variables under consideration relate. Such dynamics are however captured by the VAR results discussed in Table 4.

Insert Table III Here

Table 3 reports the estimates of Johansen Procedure and Standard Statistics.

4.3 Short-run Dynamic Adjustments

Following the Granger representation theorem, if a cointegrating relationship exists among a set of I(1) series, then a dynamic error-correction representation of the data also exists. Therefore, the following error correction model (ECM) exists for a cointegrating vector (GDS_t, INF_t, ASI_t, $MCAP_t$, $VTRANS_t$, $BDEF_t$) :

$$\Delta GDS_t = \alpha_0 + \sum_{i=0}^{n} \alpha_1 \Delta GDS_{t-1} + \sum_{i=0}^{n} \alpha_2 \Delta INF_{t-1} + \sum_{i=0}^{n} \alpha_3 \Delta ASI_{t-1} + \sum_{i=0}^{n} \alpha_4 \Delta MCAP_{t-1} + \sum_{i=0}^{n} \alpha_5 \Delta VTRANS_{t-1} + \sum_{i=0}^{n} \alpha_6 \Delta BDEF_{t-1} + \delta ECT_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots. (2)$$

Where, δ is the coefficient of the error correction term (ECT).

Thus, the Vector Error Correction Model (VECM), which indicates the short-run dynamics of the model, is tested. Essentially, the ECM captures the short-run and long-run relations between the variables under consideration. Specifically, the short-run dynamics are captured by the individual coefficients of the differenced terms as contained in table 4.

Insert Table IV Here

The results of the ECM in table 4 indicate the presence of error correction terms for inflation rate, All-share index, market capitalization and volume of transactions, displaying the appropriate (negative) sign. However, only the value of inflation rate, All-share index and market capitalization are highly significant, indicating that about 42 percent of the previous disequilibrium has been removed in the present period for market capitalization. The coefficients of ECM for government stock (GDS) and budget deficits (BDEF) are positive, suggesting that the strong short-run dynamics may have partly offset the effect of ECM term (Dutt and Ghosh, 1996).

4.4 Parameter Stability Test and Impulse Response Analysis

The stability of the parameters in the short-run stock investors' portfolio model is examined using the plots of the cumulative sum of the residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMsq). The results from the two tests are provided in figures 1A and 1B. Essentially, the existence of parameter instability is established if the CUSUM and CUSUMsq go outside the limit bands represented by the two critical (dotted) lines. From the graphs presented in figures 1A and B, both CUSUM and CUSUMsq remain within the 5 percent critical lines, indicating parameter stability throughout the sample period of the study.

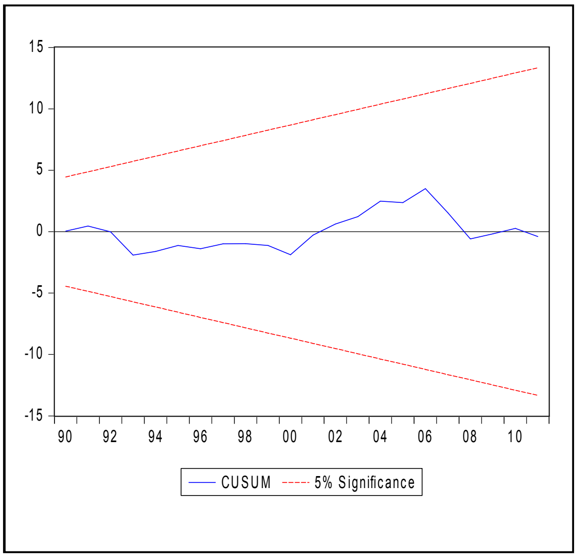

Figure 1:Cusum

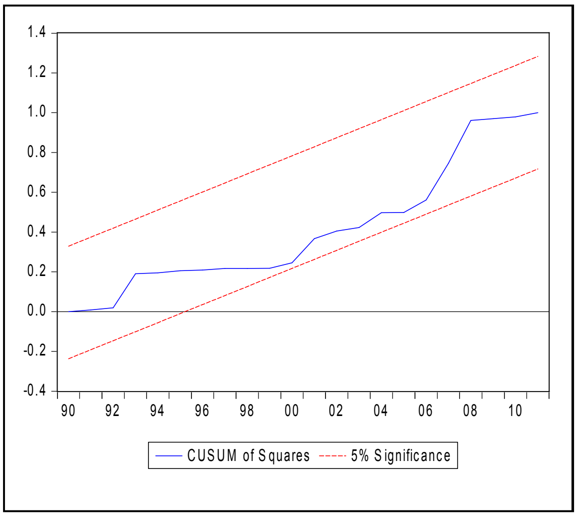

Figure 1B: Cusum of Squares

Source: Author's Computation

In order to further examine the short-run dynamic properties of stock investors' portfolio, we further supplement our results thus far by the forecast error variance decomposition (FEVD) and the impulse response (IR) analysis. FEVD provides the proportion of the movements in the dependent variables that are due to their "own" shocks, versus shocks to the other variables.

Insert Table 5 Here

Table 5 provides the FEVD estimates. From the estimates, we observe that the forecast error variance of stock investors portfolio (proxy by government stocks, GDS) by own innovations in the first year are about 100 percent. The innovations of inflation rate, All-share index, market capitalization, volume of transactions and budget deficits in this period was zero percent, an indication that the shocks of these other variables were insignificant on stock investors' portfolio. Own shock variations ranged from 82.9 percent to 100 percent. The innovations of inflation, which accounts for the forecast error variance of stock investor's portfolio, ranged from zero to 4.5 percent over the ten-year period, while the innovations of All-share index, market capitalization, volume of transactions and budget deficits ranged from 0-6.3%, 0-5.5%, 0-1.8% and 0-0.5%, respectively.

The import of the FEVD results above is that the predominant sources of fluctuations in stock investors' portfolio are due largely to own shocks and, to a lesser degree, to other variables.

Insert Table VI Here

Table 6 provides estimates from the impulse response function of stock investors' portfolio as against its "own shocks" and the shocks of inflation rate, All-share index, market capitalization, volume of transactions and budget deficits over the ten-year period. The result indicates that stock investors' portfolio (i.e, GDS) had a positive relationship with its past throughout the ten-year period. Similarly, in its response to the shocks of inflation rate, market capitalization and budget deficits, there was a positive relationship for the ten-year period. Conversely, in its response to the shocks of All-share index and volume of transactions, there was a long-run negative relationship between them. Overall, the trend over the ten-year period from both the variance decomposition and impulse response function figures is suggestive of the direction of causality being from stock prices to inflation rather than the other way round.

4.5 Causality Test Results

Essentially, the pair-wise granger causality test evaluates the null hypothesis that a particular variable of the model does not granger cause another variable. As Granger (1988) noted, if there is a cointegrating vector between inflation rate and government stocks, then there is causality among the variables, at least, in one direction. Table 7 reports the causality test results. Lag length is selected by using Akaike Info criterion (AIC), while the probability values of F-statistics are given on the right side of the table. From the table, a unidirectional causality was found between inflation and government stocks, with the causality running from government stocks to inflation at 10 percent level of significance, providing evidence in support of the Reverse Causality Hypothesis. This result is in agreement with earlier findings of Cooper (1974), Rogalski and Vinso (1977), James et al (1985), and Bruno and Paulo (2011), amongst others. Similarly, there is a unilateral causality running from government stocks to All-share index; government stocks to volume of transaction; All-share index to volume of transaction; volume of transactions to market capitalization, while bi-directional causality exists between market capitalization and All-share index at 1 percent level of significance. On the other hand, no causality was found between other variables.

Insert Table VII Here

5. Conclusion and Policy Implication

The main objective of this study is to empirically investigate the relationship between stock returns and inflation within the context of reverse causality hypothesis in Nigeria for the period 1980 – 2011. We tested the stock returns – inflation nexus and the results suggest stock returns granger causes inflation in Nigeria, within the period under focus. Similarly, there is a unidirectional causality from stock return to All-share index, and volume off transaction. In addition, empirical evidence from the Forecast Error Variance Decomposition (FEVD) and Impulse Response analysis tend to lend further support to the direction of causality, being from stock returns to inflation, rather than the other way round. Furthermore, the empirical results also tend to confirm the poor inflation hedge characteristics of stocks in Nigeria, just as it has been observed in some previous studies conducted in developed and emerging market economies.

The policy implications of our results are obvious. First, if the Nigerian government wishes to generate additional economic growth through the stock market, appropriate mix of tight monetary and fiscal policies should be put in place to minimize speculative activities and the cascading effects of major stock market development variable, namely inflation. Such tight measures would leave the individuals with less money to buy stocks or goods, but promote responsible government spending. Such efforts should be complemented by augmenting domestic production through the provision of appropriate incentives (such as the provision of inexpensive bank credit) aimed at boosting investment.

The Nigerian government should accord this findings some serious considerations in order to ensure that the stock market in Nigeria effectively plays its pivotal role of promoting growth and development of the Nigerian economy with a view to realizing the vision of making the economy one of the 20 leading economies by 2020.

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APPENDIX

Table 1: Descriptive Statistics of the Study Variables

Parameter	GDS	INF	ASI	MCAP	VTRANS	BDEF
Mean	2606.42	21.72	11742.88	2264.88	29124.76	-184762.7
Median	2760.00	12.93	600896	288.80	1700.00	-67714.15
Maximum	4009.00	76.76	51038.17	13295.00	193140.00	32049.40
Minimum	146.67	0.22	105.50	5.50	174.44	-1158518
Std. Dev.	1595.63	20.36	14254.16	3874.08	54791.53	313360.5
Skewness	-0.08	1.37	1.36	1.65	1.91	-23007
Kurtosis	1.61	3.66	4.12	4.27	5.28	7.10
Jarque-Bera	2.29	9.24	10.16	14.52	23.12	44.36
Probability	0.32	0.01	0.01	0.00	0.00	0.000
Sum	72979.87	608.05	32878.44	63416.60	815493.21	-5173356
Sum Sq. Dev.	667430	11189.08	5.49	4.05	8.11	2.65
Observations	28	28	28	28	28	28

Source: Authors' computation using E – Views 7.0

Table 2: ADF and PP Unit Root Tests

Variable	ADF			Phillips-Perron		Remarks
	Level	1st Difference	Remarks	Level	1st Difference	
GDS	-0.9390	-3.9891*	I(1)	0.5721	-4.9285*	I(1)
INF	-2.5745	-5.1420*	I(1)	-2.6925	-5.6757*	I(1)
ASI	-1.2362	-5.0207*	I(1)	-1.1956	-5.0825*	I(1)
MCAP	-0.6616	-5.4688*	I(1)	-0.4456	-5.7288*	I(1)
VTRANS	-0.5035	-6.7585*	I(1)	0.2238	-4.0430*	I(1)
BDEF	0.4651	-4.1748*	I(1)	0.2839	-4.1970*	I(1)

Note: * indicates that the variables are significant at 1 percent level.

Source: Authors' computation using E-view 7.0

Table 3: Johansen's Cointegration Test Results

Null Hypothesis	**Trace Statistics**	**Critical Value at 5 Percent**	**Null Hypothesis**	**Maximum Eigen Statistics**	**Critical Value at 5 percent**
r = 0 *	208.2348	83.9371	r = 0 *	90.0745	36.6301
r ≤ 1 *	118.1603	60.0614	r ≤ 1 *	73.1051	30.4396
r ≤ 2 *	45.0551	40.1749	r ≤ 2	23.9045	24.1592
r ≤ 3	21.1505	24.2759	r ≤ 3	13.0711	17.7973
r ≤ 4	8.0794	12.3209	r ≤ 4	8.0328	11.2248
r ≤ 5	0.0466	4.1299	r ≤ 5	0.0466	4.1299

Note: r represents number of cointegrating vectors. Trace test indicates 3 cointegrating equations at the 0.05 level while max eigen value test indicates 2 cointegrating equations.

* denotes rejection of the hypothesis at the 0.05 level.

Source: Authors' computation using E-Views 7.0

Table 4: Vector Error Correction Estimates

Vector Error Correction Estimates

Date: 10/21/13 Time: 10:34

Sample (adjusted): 1986 2011

Included observations: 26 after adjustments

Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1					
GDS(-1)	1.000000					
INF(-1)	-2.409641					
	(4.23216)					
	[-0.56936]					
ASI(-1)	0.182332					
	(0.03688)					
	[4.94431]					
MCAP(-1)	3.126757					
	(0.10456)					
	[29.9053]					
VTRANS(-1)	-0.230287					
	(0.01415)					
	[-16.2726]					
BDEF(-1)	-0.004054					
	(0.00107)					
	[-3.78540]					
C	-6049.563					
Error Correction:	D(GDS)	D(INF)	D(ASI)	D(MCAP)	D(VTRANS)	D(BDEF)

CointEq1	0.006486	0.000543	0.458128	0.010166	5.751812	16.30415
	(0.00882)	(0.00096)	(0.24851)	(0.09768)	(0.71190)	(3.84531)
	[0.73527]	[2.56687]	[2.84347]	[0.10408]	[8.07947]	[4.24001]
C	160.7201	6.066567	2324.887	-1380.829	20099.46	-94182.52
	(352.805)	(38.2860)	(9939.81)	(3906.76)	(28474.0)	(153801.)
	[0.45555]	[0.15845]	[0.23390]	[-0.35345]	[0.70589]	[-0.61237]
GDS(-2)	-0.051959	0.003113	-0.484780	0.245056	-2.795449	18.48644
	(0.08062)	(0.00875)	(2.27142)	(0.89276)	(6.50682)	(35.1462)
	[-2.64448]	[0.35579]	[-3.21343]	[4.27449]	[-0.42962]	[2.52599]
INF(-2)	-1.693397	-0.512329	13.88734	4.126646	27.98779	939.2623
	(1.82627)	(0.19818)	(51.4526)	(20.2231)	(147.394)	(796.138)
	[-0.92725]	[-2.58511]	[2.26991]	[0.20406]	[0.18988]	[1.17977]
ASI(-2)	-0.019697	-0.000358	0.374434	0.199690	-0.270083	5.371101
	(0.01422)	(0.00154)	(0.40067)	(0.15748)	(1.14776)	(6.19958)
	[-1.38503]	[-0.23169]	[3.93453]	[1.26805]	[-0.23531]	[0.86636]
MCAP(-2)	0.088438	0.001037	-4.181572	-1.269979	-2.937662	-65.40401
	(0.04328)	(0.00470)	(1.21935)	(0.47925)	(3.49299)	(18.8672)
	[2.04342]	[0.22072]	[-3.42936]	[-2.64991]	[-0.84102]	[-3.46654]
VTRANS(-2)	-0.001373	3.63E-05	0.107399	0.036206	0.059733	0.597336
	(0.00218)	(0.00024)	(0.06130)	(0.02409)	(0.17561)	(0.94855)
	[-2.63105]	[0.15357]	[1.75194]	[1.50267]	[0.34015]	[0.62974]
BDEF(-2)	0.000403	1.36E-05	-0.002777	-0.001639	0.000920	-0.146876
	(0.00037)	(4.0E-05)	(0.01048)	(0.00412)	(0.03003)	(0.16221)
	[1.08292]	[0.33613]	[-0.26486]	[-2.39790]	[3.03065]	[-2.90547]
R-squared	0.224422	0.293143	0.649857	0.337980	0.861590	0.860627
Adj. R-squared	-0.077191	0.018255	0.513690	0.080528	0.807764	0.806426

Sum sq. resids	543343.1	6398.615	4.31E+08	66625429	3.54E+09	1.03E+11
S.E. equation	173.7404	18.85414	4894.907	1923.906	14022.18	75739.99
F-statistic	0.744072	1.066408	4.772506	1.312787	16.00691	15.87849
Log likelihood	-166.2086	-108.4670	-253.0067	-228.7269	-280.3703	-324.2236
Akaike AIC	13.40066	8.959002	20.07744	18.20976	22.18233	25.55566
Schwarz SC	13.78777	9.346109	20.46454	18.59687	22.56943	25.94277
Mean dependent	-160.4742	0.379615	895.1873	371.7923	6241.511	-44441.49
S.D. dependent	167.3996	19.02862	7019.205	2006.386	31981.44	172147.8

Determinant resid covariance (dof adj.)	5.17E+36
Determinant resid covariance	5.69E+35
Log likelihood	-1291.642
Akaike information criterion	103.5110
Schwarz criterion	106.1239

Source: Authors' Computation using E-View 7.0

Table 5: Forecast Error Variance Decomposition (FEVD) of GDS

	Variance Decomposition of GDS:						
Period	S.E.	GDS	INF	ASI	MCAP	VTRANS	BDEF
1	107.9359	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	220.2893	97.92470	0.074610	0.590057	0.632530	0.321914	0.456193
3	341.0287	92.70308	0.577289	2.275386	3.429608	0.527269	0.487370
4	456.3078	88.60152	1.332692	4.843077	3.692527	1.142868	0.387315
5	553.0640	86.29046	2.028869	6.311726	4.000700	1.039447	0.328802
6	630.9379	85.84761	2.563713	6.349907	3.949487	1.036622	0.252659
7	708.2910	84.26678	3.221123	6.122746	4.916647	1.245053	0.227654
8	779.9408	83.11141	3.423359	6.193505	5.441767	1.581857	0.248099
9	837.6049	83.17472	3.698827	5.663456	5.533598	1.654195	0.275200
10	891.4496	82.9191 9	4.532303	5.020234	5.386941	1.824403	0.316929

Source: Authors' Computation using E-View 7.0

Table 6: Impulse Response of GDS

	Response of GDS:					
Period	GDS	INF	ASI	MCAP	VTRANS	BDEF
1	107.9359	0.000000	0.000000	0.000000	0.000000	0.000000
2	189.3941	6.017180	-16.92156	17.52000	-12.49865	14.87879
3	245.5481	25.20284	-48.57928	60.67703	-21.37758	18.58590
4	276.8917	45.86392	-86.24275	60.82605	-42.02888	15.48035
5	281.8897	58.57482	-96.03227	67.44532	-28.28100	14.11679
6	278.9254	63.24396	-77.27603	59.03295	-30.77588	0.231860
7	284.6083	77.16157	-73.74604	94.56969	-46.03825	11.67441
8	287.7963	68.30042	-83.42184	91.85334	-58.10698	19.16039
9	279.2237	71.59435	-45.36768	75.63098	-44.53067	20.53163
10	274.6002	100.3350	12.69370	63.13747	-53.78354	24.24515

Source: Authors' Computation using E-View 7.0

Table 7: Pairwise Granger Causality Tests

Date: 01/24/14 Time: 14:13

Sample: 1984 2011

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
INF does not Granger Cause GDS	26	0.17892	0.8374
GDS does not Granger Cause INF		2.87362	0.0789
ASI does not Granger Cause GDS	26	1.36645	0.2768
GDS does not Granger Cause ASI		3.84235	0.0378
MCAP does not Granger Cause GDS	26	0.46597	0.6339
GDS does not Granger Cause MCAP		2.38428	0.1166
VTRANS does not Granger Cause GDS	26	1.55400	0.2348
GDS does not Granger Cause VTRANS		2.73236	0.0882
BDEF does not Granger Cause GDS	26	3.12956	0.0646
GDS does not Granger Cause BDEF		2.08510	0.1493
ASI does not Granger Cause INF	26	1.19800	0.3216
INF does not Granger Cause ASI		0.11184	0.8947
MCAP does not Granger Cause INF	26	0.53340	0.5943
INF does not Granger Cause MCAP		0.25092	0.7804
VTRANS does not Granger Cause INF	26	0.45851	0.6384
INF does not Granger Cause VTRANS		0.37671	0.6907
BDEF does not Granger Cause INF	26	0.47494	0.6284
INF does not Granger Cause BDEF		0.52547	0.5988
MCAP does not Granger Cause ASI	26	10.9609	0.0005
ASI does not Granger Cause MCAP		4.94160	0.0174

VTRANS does not Granger Cause ASI	26	15.5864	7.E-05
ASI does not Granger Cause VTRANS		14.1396	0.0001
BDEF does not Granger Cause ASI	26	0.59551	0.5603
ASI does not Granger Cause BDEF		17.7364	3.E-05
VTRANS does not Granger Cause MCAP	26	9.71333	0.0010
MCAP does not Granger Cause VTRANS		181.539	6.E-14
BDEF does not Granger Cause MCAP	26	0.66035	0.5271
MCAP does not Granger Cause BDEF		63.3018	1.E-09
BDEF does not Granger Cause VTRANS	26	6.07276	0.0083
VTRANS does not Granger Cause BDEF		30.3853	6.E-07

Source: Authors' Computation using E-View 7.0